EXECUTIVE SUMMARY
August 2, 2004, ZENH Workshop

INTRODUCTION

On August 2, 2004, Navigant Consulting, Inc. (NCI) conducted a public workshop on behalf of the California Energy Commission's Public Interest Energy Research (PIER) and Renewable Energy programs. The purpose of this workshop was to convene key stakeholders in the residential photovoltaics (PV) market to (1) illustrate the process of developing new business models, and (2) facilitate partnering among these key stakeholders for a planned September 2004 R&D solicitation. Specifically, PIER will be soliciting proposals that demonstrate new PV business models designed to significantly reduce or eliminate the incremental costs of the PV component of Zero Energy New Home (ZENH) features to homeowners and which deal with other barriers.

New PV business models are intended to create innovative changes in business relationships among parties typically involved in the manufacture, distribution and sales of PV systems into new home construction. PIER is interested in exploring how new business models for ZENH might be able to address persistent cost barriers and reduce the incremental costs of ZENHs to the homeowner, thereby creating a more sustainable model for ZENH in California. Some possible key outcomes from implementing new business models for ZENH are listed below along with examples of possible business model changes that can help achieve each of the illustrative key outcomes.

Illustrative Key Outcome	Examples of Potential Business Model Elements
Reduce Liability/Risk	▪ PV manufacturer or insurers guarantee energy output and system performance. ▪ Third party assumes risks of ownership, operations and maintenance, by either selling output or leasing equipment to homeowners or homeowner associations.
Create Market for PV Output	▪ Utility purchases PV output from homeowners or homeowner associations at prices structured to reflect the avoided marginal cost of on-peak power (e.g., as an alternative to net metering).
Encourage PV Installations through Legislation and Regulation	▪ Government and/or utilities requires new homes and subdivisions to self provide peak energy requirements in excess of a certain targeted baseline. ▪ Local government adopts ZENH goal or requirement for new subdivisions and provides access to fast-track plan checking and permitting as an incentive.
Reduce Upfront Costs	▪ Local government streamlines permitting and other land use processes for builders installing PV, in return for which builders agree to not pass costs of PV onto home buyers. ▪ Utility provides a rebate to homeowners with PV systems. (Similar to programs for energy efficient appliances and HVAC). ▪ Third party installs PV on homeowner's roof and charges monthly electric bill as lease or finance payment.

Illustrative Key Outcome	Examples of Potential Business Model Elements
Reduce Transaction/ Installation Costs	▪ Local government provides PV-specific training for inspectors and appraisers. ▪ Utilities standardize products and services for builders throughout the state to reduce confusion and costs. (e.g. through partnerships between municipal utilities or IOUs.) ▪ PV manufacturers work with builders to develop standardized PV roofing materials that are quick and easy to install.
Increase PV Appeal/ Aesthetics	▪ PV manufacturer partners with builders, roofing companies or others to develop new PV products and services (e.g., attractive BIPV roofing products with cost-effective installation and product warranties/ guarantees).

Note: Proposers to the 2004 PIER ZENH RFP may use these ideas to assist them in developing business models that capture ways to reduce the incremental costs to the homeowners. In turn, the business model results can be incorporated into RFP responses to show how the incremental cost reductions will be accomplished in the project via business partnerships . However, this does not imply endorsement by the California Energy Commission of any particular models. Bidders are encouraged to develop other business model concepts independently.

SUMMARY OF WORKSHOP PROCEEDINGS

A group of nearly 120 members of the PV industry, builders and developers, the financial community, government, utilities, community groups, environmental advocates, and consulting professionals attended the August 2nd workshop. The list of participants is attached as Appendix A.

During the morning session, PIER discussed the goals of the day's proceedings and how this workshop fits with its planned R&D solicitation. (Attachment B) PIER subsequently provided a definition of Building Integrated Photovoltaics (BIPV) in response to questions asked at the workshop. (Attachment I) NCI then provided a framework for creating new business models (Attachment C) prior to breaking participants into six key stakeholder break-out groups: the PV industry, builders, homebuyers, financial institutions, utilities, and local government. These six groups were assigned the task of identifying the key barriers to the adoption of PV in new home construction, the potential value of ZENH (i.e., the value proposition) to their assigned stakeholder groups, and potential business model elements that the group of stakeholder could imagine implementing. The six stakeholder groups then shared their ideas with the plenary. (Attachment D) Prior to breaking for lunch, NCI described the process of assembling business model elements into business models, which was the afternoon's task. (Attachment E)

Following lunch, participants assembled into six break-out groups, this time however the stakeholders were mixed and asked to tackle the task of developing new residential PV

business models. Their ideas were brought back to the plenary in the afternoon for sharing. (Attachment F)

The work products developed by both the morning and afternoon breakout groups are documented in the appendices, along with copies of PIER's and NCI's presentations. In addition, the material used in the workshop to initiate conversation in the break-out groups is included. (Attachments G and H)

WORKSHOP HIGHLIGHTS

Several recurring themes pertaining to the development of new business models for ZENH arose during the course of the workshop. In particular, they are notable for having been raised by multiple break-out groups and by multiple stakeholder groups.

1. **Reduce installed costs.** There was general consensus that the high cost of PV remains the primary barrier to widespread adoption. Discussions encompassed a wide variety of potential approaches to reduce or eliminate the cost of PV to builders and homeowners, including reducing product and installation costs and risks, third party ownership, and a wide variety of potential financing vehicles. One manufacturer pointed out that economies of scale alone could not reduce costs to the targeted levels needed to become competitive with other energy supply sources; consequently, any significant price changes would need to come from technological changes and/or simplified installation.

2. **Improve training and education.** A number of parties noted a need for training and education. In addition to educating consumers to dispel misconceptions about PV, the important role of government in establishing consistent PV standards, and training appraisers and inspectors in consistent application and enforcement of those standards, was discussed.

3. **Aggregate transactions.** Various parties observed that aggregation (pooling) of purchases, operations, maintenance and/or financing could have substantial benefits – from reducing costs by accessing economies of scale, to shifting risks away from builders and home buyers. In addition, it was noted that increasing the size of transactions could provide access to additional funding sources. The minimum threshold needed to access conventional types funding sources and to use conventional types of financial mechanisms was estimated by one group at $50 million.

4. **Identify roles for third parties.** In many business models, a need for a third party of some kind was identified to play a significant role. The role of the third party was highly variable, both as to the type(s) of entity(s) and the function(s) to be assumed, depending on the specific business model being explored. For example, one party proposed an integrator or installer that could merge the energy efficiency and PV components of ZENH into a

single package in order to significantly simplify choices and transactions for both the builder and the home buyer.

5. **Reduce ownership risks.** Various parties suggested including PV in homeowner's insurance with just like any other household appliance and leasehold improvements. Others suggested creating a secondary market for used PV which, once established, could reduce lenders' concerns about stranded investments while concurrently mitigating home owners' concerns about technological obsolescence (because used products could be traded in for newer, more efficient products). Third party ownership models were also deemed important in shifting ownership risks and builders' liability.

6. **Simplify PV transactions.** Many parties observed that PV transactions are too complex for the average home buyer. Suggested remedies included one stop shopping approaches in which all facets of PV transactions are handled by a third party, from purchase and installation, to financing, operations, and maintenance. The appliance model (e.g., PV as a household appliance, like a dishwasher) was discussed as one means to significantly streamlining and simplifying PV choices.

7. **Change the way residential PV is financed.** In addition to bundling PV transactions to reduce costs and access additional sources of capital, workshop participants discussed a variety of potential changes to the manner in which residential PV is financed. One suggestion was to apply PV incentives towards home buyers' closing costs to increase home buyers' ability to qualify for a home loan.

8. **Increase demand for PV.** Suggestions ranged from increasing demand by reinforcing the prestige value of PV, to creating new aesthetically pleasing products and creating new markets for PV output. One party suggested that utilities could sell PV at the marginal avoided cost of on-peak power as an alternative to net metering. Others suggested long term contracts for purchase of PV output by utilities at firm prices over the life of the PV system (similar to the German model). In addition, parties observed that legislative and regulatory approaches, such as PV zoning requirements, could increase demand. One party cited Marin County's program in which new large homes that exceed Title 24 requirements by 25% or more receive expedited permitting, and suggested that regulators and utilities could require that new homes self provide that portion of on-peak energy that exceeds specified baseline allocations for utility planning purposes. In other words, utilities and regulators could choose to "cap" the amount of energy that a utility is obligated to provide to any residential user, encouraging the builder and the home owner to install PV.

NEXT STEPS

During the month of August, NCI will assist interested stakeholders in the development of business models and partnerships in anticipation of PIER's solicitation in September. Three

working groups will be facilitated with conference calls to minimize travel time and expenses and then complemented by video and web-based tools when necessary. Participation in these working groups is voluntary, and is not a requirement of the R&D solicitation.

ATTACHMENTS

A List of Workshop Participants
B PIER Presentation
C Workshop Introduction
D Morning Breakout Results
E Workshop Afternoon Preparation
F Afternoon Breakout Results
G Example Business Model Element
H Example Business Models
I BIPV Definition